THE LIFE HISTORY AND ADULT MORPHOLOGY OF *PHILIRIS ZISKA TITEUS* D'ABRERA (LEPIDOPTERA: LYCAENIDAE)

P.R. SAMSON[1] and S.J. JOHNSON[2]

[1]*BSES Limited, PMB 57, Mackay Mail Centre, Qld 4741 (Email: psamson@bses.org.au)*

[2]*Queensland Museum, PO Box 3300, South Bank, Qld 4101*

Abstract

The immature stages of *Philiris ziska titeus* D'Abrera are recorded and adult females identified with certainty for the first time in Australia. The food plant on Cape York Peninsula was *Trophis scandens* (Moraceae). Eggs were found beneath leaves of *T. scandens* within patches of dead leaf tissue. Larvae fed beneath leaves before pupating on top of a leaf in line with the midrib. The egg, each of the six larval instars and the pupa are described. The identity of presumed females previously reported from Australia is confirmed.

Introduction

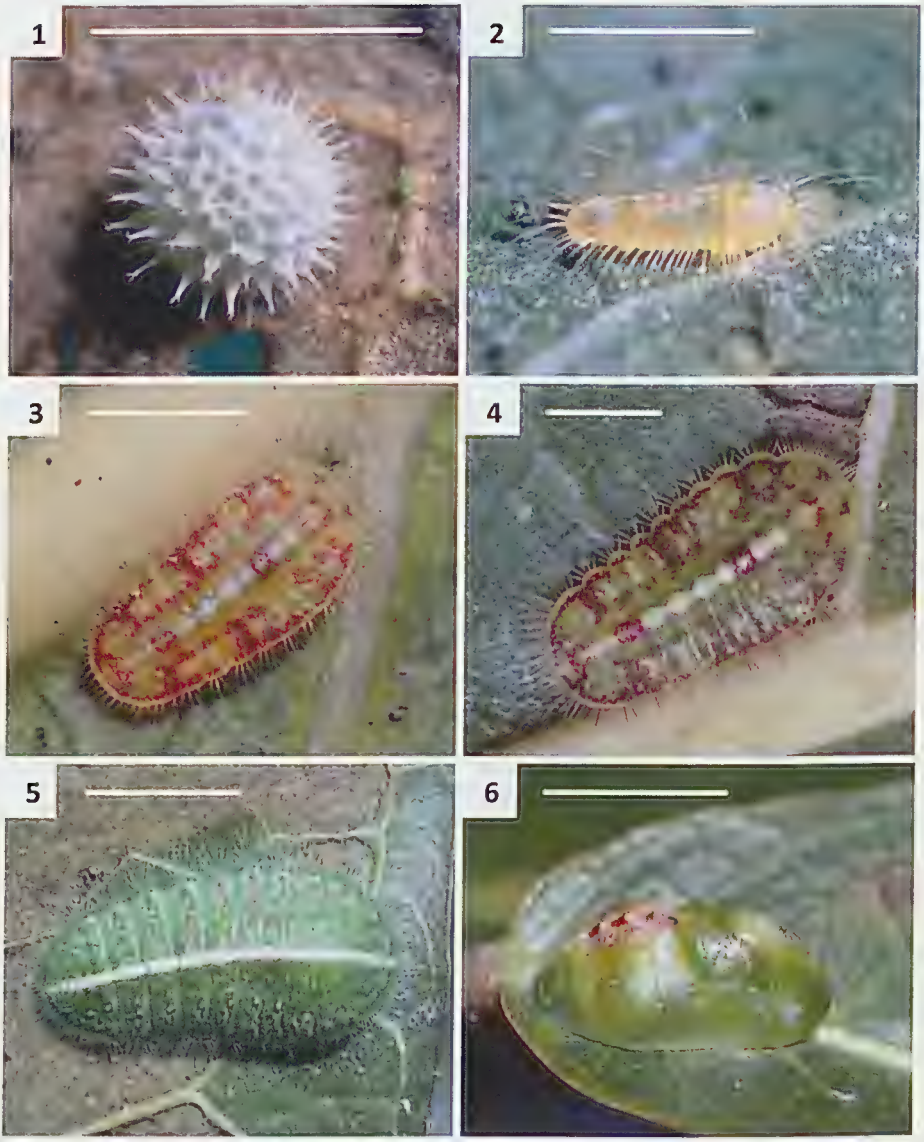
Philiris ziska (Grose-Smith) is known from Waigeo, West Papua to Papua New Guinea and was originally reported from Cape York Peninsula in northeastern Australia on the basis of a small series of males from Iron Range (Kerr 1967). The subspecies *P. z. titeus* D'Abrera was erected for the Australian population (D'Abrera 1971) and two paratype females were included. The identity of these females was doubted by Common and Waterhouse (1981) and a separate subspecies was not recognised by Braby (2000), who provided additional descriptive notes and illustrations of both sexes. Other authors, however (*e.g.* Sands and New 2002), have continued to recognise *P. z. titeus* as the valid name for the Australian population.

The life history of typical *P. ziska* has been described from Papua New Guinea, where the food plant is *Trophis scandens* (Moraceae) (Parsons 1984), but that of the Australian population has not been recorded previously. Here we record the food plant, describe the immature stages and provide details of reared adults from Iron Range.

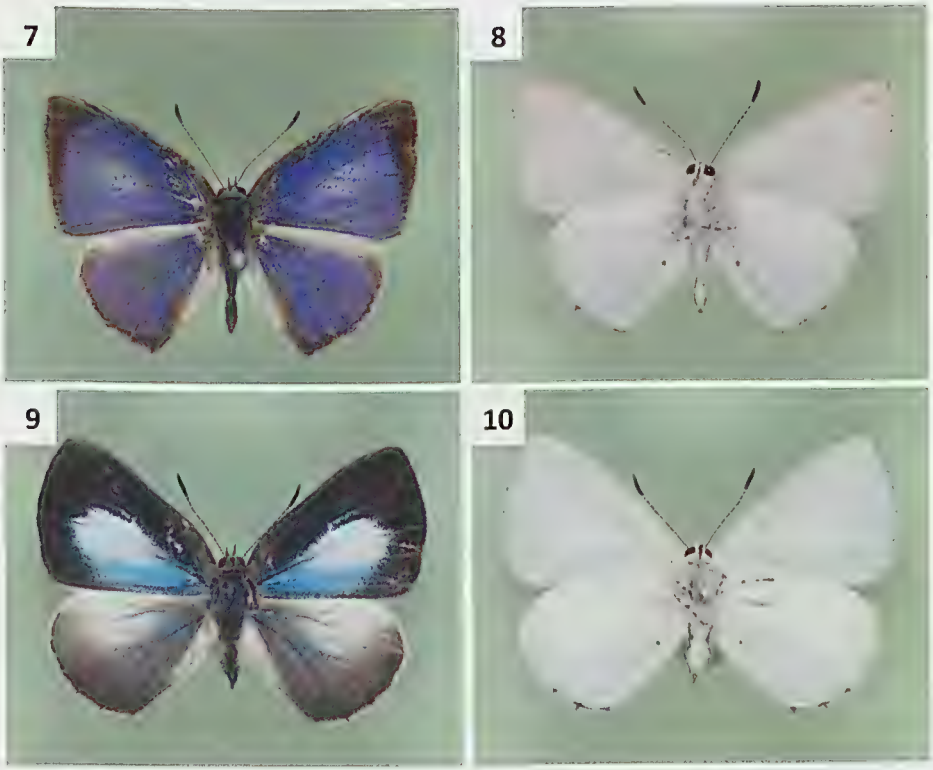
Immature stages

Egg (Fig. 1). Diameter 0.8 mm. A flattened sphere, with irregular pattern of ridges with long spines, broad at the base and simple or bifid at the tip, longest at sides of egg and short around micropyle; colour whitish-blue aging to white.

First instar larva (Fig. 2). With long, posteriorly-curved, pale brown dorsal setae, two similar pairs on second thoracic segment (T2), one pair on T3, none on first or second abdominal segments (A1-A2), one pair on each of A3-A5 and two pairs (post. pair shorter) on A6, and long white marginal setae. Body and head yellowish green; spiracles brown. Later in instar, larvae develop a whitish middorsal line on A2-A5 and reddish lateral and dorsal patches (especially on A1 and A6).



Figs 1-6. Immature stages of *Philiris ziska titeus* from Iron Range, Qld. (1) egg; (2-5) larval instars I, II, III and VI respectively; (6) pupa. (Head to right in Figs 2-6.) Scale bars (1-4) = 1 mm, (5-6) = 5 mm.



Figs 7-10. *Philiris ziska titeus* from Iron Range, Qld. (7-8) male upperside and underside (field-collected, Gordon Creek); (9-10) female upperside and underside (reared).

Second instar larva (Fig. 3). Flattened, broadest at T3, with five short brown setae arising from prothoracic plate, two laterally and three posteriorly, very short dorsal setae, one pair on T2 and two pairs on each of T3-A6, long, white and brown branched marginal setae and colourless secondary setae with expanded tips. Yellowish green, with a white middorsal line on T2-A9, reddish lateral and dorsolateral lines joined transversely on T1, T2-T3, A3-A4 and A6-A7, and reddish dorsal patches on A1 and A6. Head green; spiracles brown.

Third instar larva (Fig. 4). Similar to second instar but more green in colour, with obscure whitish patches between reddish dorsolateral and lateral lines; setae on prothoracic plate present but not conspicuous and with numerous other secondary setae arising from plate.

Fourth instar larva. Similar to third instar but reddish markings fading during instar and reddish dorsal patches on A1 and A6 reducing to faint orange marks on either side of a white middorsal line that is edged yellow. Spiracles white. Newcomer's organ (NO) present on A6 (not discernible in earlier instars).

Fifth and sixth (final) instar larvae (Fig. 5). Very flattened, with long white and brown branched marginal setae and colourless secondary setae with expanded stellate tips. Green with a faint purplish lateral line and a complete, white middorsal line that is faintly edged yellow and sometimes with slight orange edging on A1 and A6, plus obscure purplish brown transverse bars and yellowish green blotches dorsolaterally. Head green; spiracles white; NO present.

Pupa (Fig. 6). Smooth, squat, broadest at A3, dorsally constricted between A1 and A2 at central girdle. Dark green with whitish areas anteriolaterally on T2 and dorsolaterally on A2-A3; T2 and A2-A5 dorsally light green with cream patches and dark brown spots, a raised black middorsal patch anteriorly on A2, dark brown middorsal and subdorsal patches on A2-A5 and a light green middorsal line posterior to A5. Spiracles white.

Adult morphology

Male (Figs 7-8). As discussed and illustrated by D'Abrera (1971) and Braby (2000). Some specimens with a white suffusion in the postmedian area, varying from scattered scales to a prominent white patch (Fig. 7).

Female (Figs 9-10). As discussed and illustrated by Braby (2000). Forewing upperside: black with a central white patch edged blue extending from within distal end of cell to submedian area and from M_2 to CuA_2; a broad, purplish-blue anal streak extending from base to post median area; inner margin narrowly black overlaid with scattered purplish-blue dusting. Forewing underside: white with fine black tufts at end of veins along termen. Hindwing upperside: brownish-black; costa and apex white, extending basally into distal half of cell and postmedian area; anal lobe white; faint blue dusting in distal half of cell; veins prominently brown; narrow white fringe along dorsal termen; small projections on anal and cubital veins which can be lost in worn specimens. Hindwing underside: white; fine black margin at tornus joining small tufts at the ends of the cubital and anal veins; a distinct small black spot in the submedian area above the anal vein.

Life history

We collected eggs and larvae on *Trophis scandens* near Gordon Creek and the Claudie River, Iron Range, between 9-13 August 2008.

Eggs were found laid singly within brown, skeletonised patches beneath leaves of the food plant; none of about 20 unhatched or hatched eggs was

found on intact green epidermis. Several early-instar larvae were also found beneath leaves.

Three larvae were reared from egg to adult at Mackay, two at a constant temperature of 24-25°C following ambient conditions for 2-4 days after eclosion and one at ambient throughout development. They were fed fresh excised leaves of *T. scandens* every second or third day and all passed through six larval instars. The duration of larval instars I-VI at 24-25°C for two females was 8-9 days, 6 days, 5 days, 5 days, 6 days and 7-8 days respectively. Pupal duration was 11 days, giving a total period from eclosion to adult of 48-50 days. The single larva reared under ambient conditions produced a male 54 days after eclosion.

Larvae remained beneath leaves throughout their development and ate only the lower leaf tissue, leaving the upper epidermis intact. However, they moved to the upper surface of leaves to pupate, attached by anal hooks and a central girdle. All four larvae that pupated in captivity left the leaf on which they had been feeding and pupated on leaves a short distance away on the stem, three at the leaf base facing away from the petiole and one midway along the leaf, all in line with the midrib. Pupation took place 3-4 days after larvae ceased feeding and moved to the upper leaf surface.

Discussion

Our description of the life history is similar to that provided by Parsons (1984) for *P. ziska* in Papua New Guinea. However, larvae that we reared passed through six larval instars and not five as reported by Parsons. Parsons' (1984) descriptions of larval instars I, II and V are broadly similar to ours for instars I, II and VI but we could not determine with any certainty the correspondence between his descriptions of instars III and IV and ours for instars III-V. Parsons noted that larvae fed only on *T. scandens* and not on related plants in Papua New Guinea.

The limited description of adult males of *P. z. titeus* provided by D'Abrera (1971) was based on only two specimens and, although the illustration of the holotype provided appears to show some white suffusion and Kerr (1967) had mentioned it previously, D'Abrera failed to include it as a character. A lack of consistency in the presence of the white suffusion was noted by Kerr (1967). In our experience, most males have limited white scaling in the postdiscal area but occasional specimens have a distinct white patch similar to that seen in occasional specimens of *P. diana papuana* Wind & Clench. The subspecies *P. z. titeus* was not recognised by either Braby (2000) or Edwards *et al.* (2001). However, Sands and New (2002) continued to recognise *P. z. titeus* on the basis of a much smaller size in both sexes, the usual presence of the white suffusion on the forewing in males and much larger white areas on both fore and hind wings in females. Unless shown otherwise by detailed comparison with material of *P. ziska* from New Guinea

(including the type locality of Kapaur, West Papua), this subspecific distinction should be maintained.

The rearing of several females has confirmed the placement of similar specimens in *P. ziska* by Braby (2000). The female paratypes included in *P. z. titeus* by D'Abrera (1971) are also from the Claudie River (Iron Range) (Sands 1981) but have not been reexamined and the question of their identity (Common and Waterhouse 1981) remains unresolved. Females of typical *P. z. ziska* were illustrated by D'Abrera (1971) and Parsons (1991, 1998).

Acknowledgements

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References

BRABY, M.F. 2000. *Butterflies of Australia: their identification, biology and distribution.* CSIRO Publishing, Melbourne; xxvii + 976 pp.

COMMON, I.F.B. and WATERHOUSE, D.F. 1981. *Butterflies of Australia.* Revised Edition. Angus and Robertson, Sydney; xiv + 682 pp.

D'ABRERA, B. 1971. *Butterflies of the Australian Region.* Lansdowne, Melbourne; 415 pp.

EDWARDS, E.D., NEWLAND, J. and REGAN, L. 2001. Lepidoptera: Hesperioidea, Papilionoidea. In: Wells, A. and Houston, W.W.K. (eds), *Zoological catalogue of Australia.* Vol. 31.6. CSIRO Publishing, Collingwood; x + 616 pp.

KERR, J.F.R. 1967. New records of Lycaenidae (Lepidoptera) in Australia and a description of a new subspecies. *Journal of the Australian Entomological Society* **6**: 49-51.

PARSONS, M. 1984. Life histories of four species of *Philiris* Röber (Lepidoptera: Lycaenidae) from Papua New Guinea. *Journal of the Lepidopterists' Society* **38**: 15-22.

PARSONS, M. 1991. *Butterflies of the Bulolo-Wau valley.* Handbook No. 12 of the Wau Ecology Institute. Bishop Museum Press, Honolulu; v + 280 pp.

PARSONS, M. 1998. *The butterflies of Papua New Guinea: their systematics and biology.* Academic Press, London; xvi + 736 pp, xxvi + 136 pls.

SANDS, D.P.A. 1981. *The ecology, biogeography and systematics of the tribe Luciini (Lepidoptera: Lycaenidae).* PhD thesis, University of Queensland, Brisbane.

SANDS, D.P.A. and NEW, T.R. 2002. *The action plan for Australian butterflies.* Environment Australia, Canberra; 385 pp.